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The pupae of *Erichsonius cinerascens* (GRAVENHORST, 1802) and *Heterothops niger* KRAATZ, 1868 (Coleoptera: Staphylinidae)

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ABSTRACT. The pupae of *Erichsonius cinerascens* (GRAVENHORST, 1802) and *Heterothops niger* KRAATZ, 1868 have been described and illustrated for the first time. The diagnostic characters of the examined pupae are mentioned.

Key words: entomology, morphology, Coleoptera, Staphylinidae, *Erichsonius cinerascens*, *Heterothops niger*, pupa.

INTRODUCTION

The paper is the first report of the pupa stage for *Heterothops* STEPHENS, 1829 - 149 species are known in the world. Among 155 species of *Erichsonius* FAUVEL, 1874 described in the world, actually some information on the pupae of only *E. alumnus* FRANK, 1975 and *E. pusio* HORN 1884, distributed in Canada and USA, has been provided so far (HERMAN 2001, SCHMIDT 1996).

Erichsonius cinerascens is a eurytopic, hygrophilous and phytodetriticolous species, distributed in Morocco, Europe, Russia and Armenia. In Poland it is a common staphylinid known from the greater part of the country. It occurs in moss (*Sphagnum*) on high-, transitional- and low moors, under plant debris, leaf litter and slime on boggy soils, on water shores and river-banks, preferring the places just at their shoreline. *Heterothops niger* is a european staphylinid, known from Britain, Sweden, Denmark, Holland, Belgium, France, Germany, Czech Republic, Slovakia, Switzerland, Italy, Austria, Hungary, Romania and Russia. It is defined as a eurytopic, microcavernicolous and phytodetriticolous species, inhabiting mole (*Talpa europea*) nests, and rotten plant remains, compost, hay and straw heaps in forests margin, fields and meadows (BURAKOWSKI and al. 1980, KOCH 1989).

The morphology of the immature stages of the mentioned species is poorly known. HINTON (1981) provided a description of egg, whereas TOPP (1978) an illustration of the antenna of the second larval instar of *E. cinerascens*. Some morphological larval features of *H. niger* were reported by PAULIAN (1941) and POTOTSKAYA (1967). The pupae of *E. cinerascens* and *H. niger* have not been described to date.

MATERIAL EXAMINED

Erichsonius cinerascens - 5 pupae (1 f); *Heterothops niger* - 1 f .

The examined pupae of *E. cinerascens* and *H. niger* were obtained by rearing adults in room temperature (20^{o}C±2). The mature individuals of *E. cinerascens* were collected on the 28th of March, on the inner forest water body shores in Klarów (10 specimens) - UTM: FB37; SE Poland, using the method of sifting leaf litter, and on the 21st of April 2005 on the dystrophic lake shore in Kaniwola (35 specimens) - UTM: FB39; SE Poland, using the method of "flooding with water" from the moss layer. In laboratory the pupation of *E. cinerascens* was observed from the 16th of May. The adults of *H. niger* were collected on the 25th of March 2005 by sifting hay heaps on the meadow in Milejów (5 specimens) - UTM: FB37; SE Poland. The pupation of *H. niger* was observed on the 13th of June 2005. Imagines of both species were determined by the second author. Total drawings of live pupae were made. For more detailed studies, fragments of pupal exuvia were used.

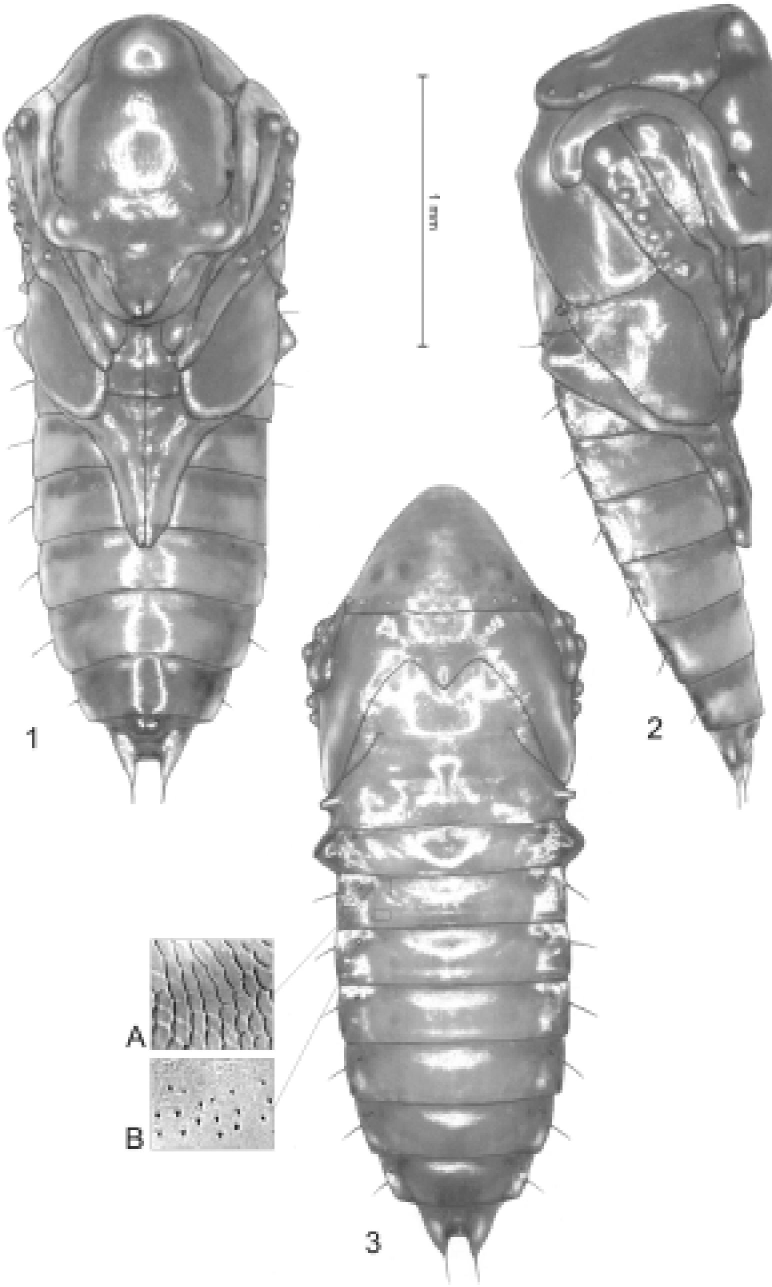
DESCRIPTION

***Erichsonius cinerascens* (GRAVENHORST, 1802)**

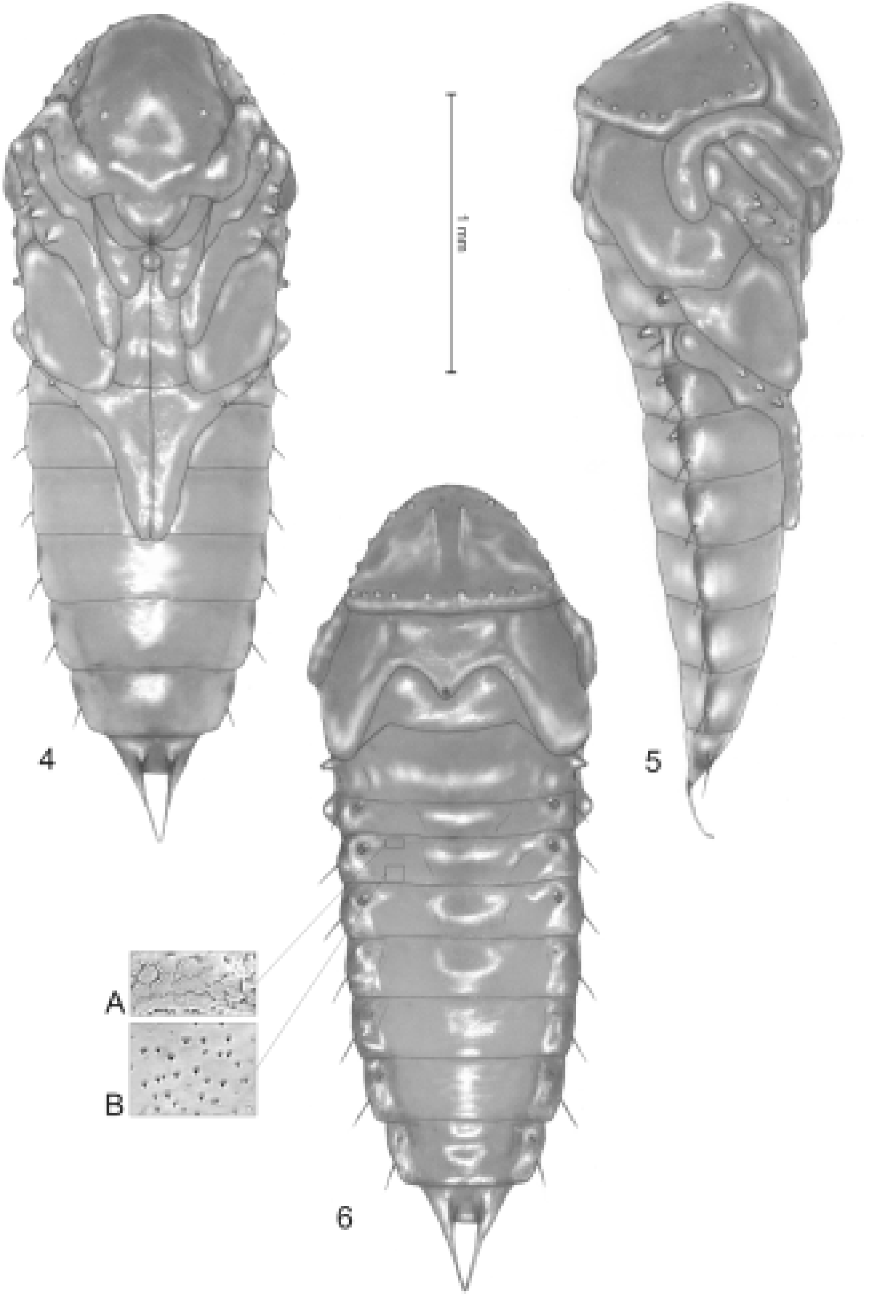
Body length (without abdominal process): 2.74-2.94 mm (mean 2.84 mm); width in widest place (between hind knees): 1.06-1.10 mm (mean 1.08 mm); head width (the level of eyes): 0.68-0.70 mm (mean 0.70 mm); pronotum width (at the base): 0.76-0.80 mm (mean 0.78 mm), 1.9 times as broad as long (from dorsal view). Colour yellowish brown with darker edges, setiform projections brown, cuticula heavily sclerotized. Head 1.7 times as long as broad. Labrum about 1.3 times as wide (at the base) as long; mandible crossed. Antennae curving backwards, a little protruding beyond 1/3 of the length of the shortened elytra (Fig. 2). Pronotum with several (at least 8), tiny (badly visible), protuberances situated at the posterior and lateralo-posterior margins; the surface with 4-8 cavities. Wings extending to ventral side; protruding beyond posterior margin of 2nd visible abdominal sternite (Figs 1, 2); hind margin of shortened elytra clearly visible at ventral and lateral view only. Tibiae and tarsi directed obliquely to the middle of the body. Middle tibiae with 5 well visible outlines of protuberances. Hind tarsi distinctly protruding beyond posterior margin of 4th (clearly visible as 3rd) abdominal sternite, reaching 1/3 of the length of sternite (Figs 1, 2). Abdomen with 9 tergites and 7 sternites visible. Segments III-V almost equal in width, below segment V abdomen narrowed to the terminal part of the body (Fig. 3). Abdominal tergite I about twice longer than the 2nd tergite, its anterior margins almost invisible. Microstructure on abdominal segments diversified as in Figs 3A, 3B. Reticulate microstructure (Fig. 3A) on the anterior part of tergite (or sternite) not reaching half of length of sclerite; tear like microstructure (Fig. 3B) occupying somehow the band on the posterior part of sclerites; the surface between both microstructures plain. Abdominal segment I with cuticular processes as in Figs 7A, 7B. Segments II-VIII each bearing a pair (7 pairs in total) of simple spines on sides; spines on segment VIII slightly shorter than on the other segments (Figs 1, 3, 9, 10). Segments III-VIII more than twice (2.2-2.7 x) as long as spines (Figs 1, 3, 9). Terminal sternite in female pupa with a pair of relatively short, simple ventral prolongations (Vp) and a pair of straight, terminal abdominal prolongations (Tp) (Figs 13, 13A, 13B). Ventral prolongations (Vp) slightly protrude beyond the posterior margin of segment IX (Fig. 13). Abdominal tergites I-IV with tuberculate, functional spiracles, 1st pair situated more laterally than the rest (Figs 3, 15); tergites V-VIII bearing atrophied spiracles (Figs 3, 17).

***Heterothops niger* KRAATZ, 1868**

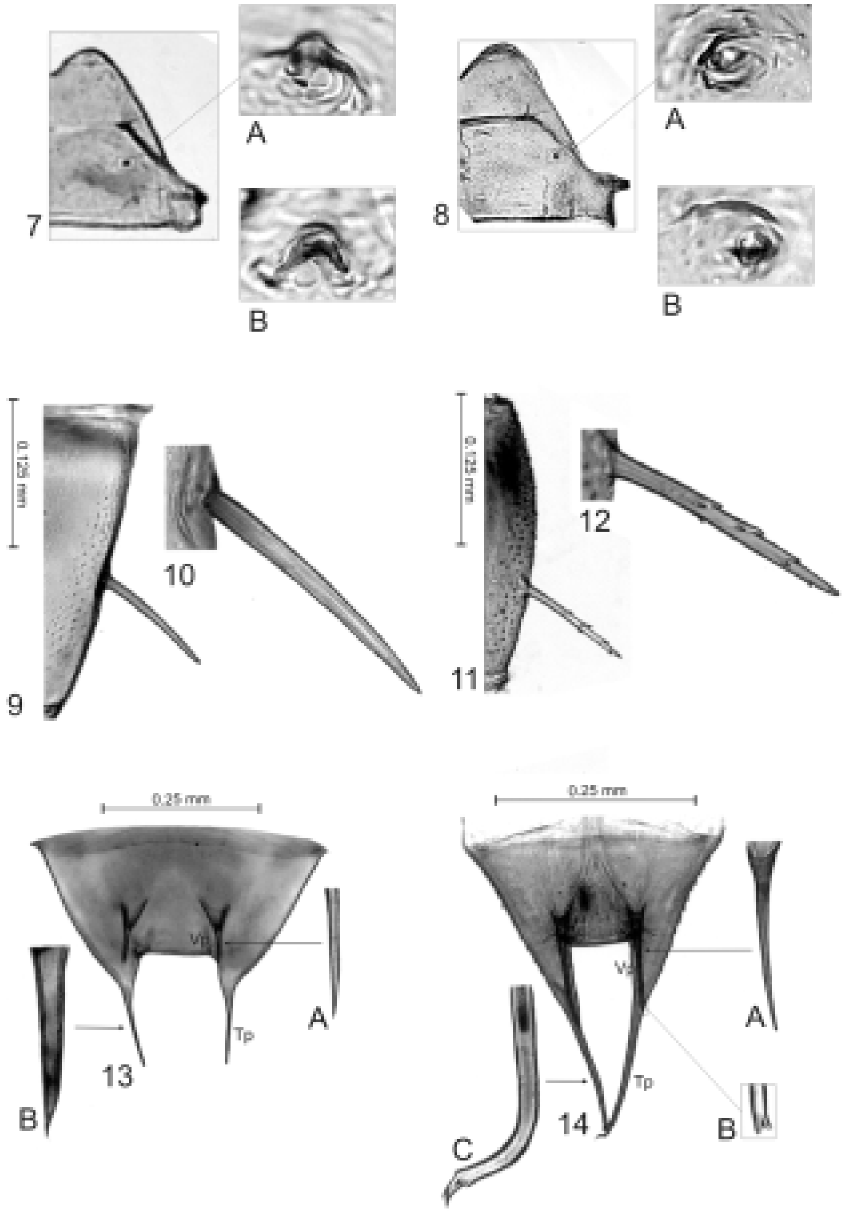
Body length (without abdominal process): 2.70 mm, width in widest place (between antennae): 1.06 mm; head width (the level of eyes): 0.60 mm; pronotum width (at the base): 0.80 mm, 1.7 times as broad as long. Colour light yellowish brown, setiform projections darker brownish-red brown. Head 1.4 times as long as wide, with 2 frontal, small protuberances (Figs 4, 5). Labrum about 1.5 times as broad (at the base) as long (Fig. 4). Antennae relatively long, curving backwards, protruding slightly beyond half of the length of the shortened elytra (Fig. 5). Pronotum bearing about 25 protuberances situated at margins and medially, surface rugged. Wings extending to ventral side, not reaching posterior margin of the 2nd visible abdominal sternite (Figs 4, 5). Tibiae and tarsi directed obliquely to the middle of the body. Each middle and hind tibiae with respectively 8 (5 small) most sharp and 4 (one small) sharp outlines of protuberances. Hind tarsi slightly protruding beyond posterior margin of the 4th (actually 5th) visible abdominal sternite (Figs 4, 5). Abdomen with 9 tergites and 7 sternites visible; gradually widened from segment II to segment IV, and then narrowed below this segment to the terminal part of the body (Fig. 6). Abdominal segment I 1.8 x wider than the next one. Abdominal tergites with diversified microstructure, on anterior part as in Fig. 6A, on the remaining parts as in Fig. 6B. Abdominal segment I with cuticular processes as in Figs 8A, 8B. Each segments II-VIII with a pair of spines (7 pairs in total). Spine bearing sparse, cuticular processes occurring on the 3/4 of length (Fig. 12). Segments II and VIII 1.4-1.8 x while III-VII 2.0-2.6 x as long as spines (Fig. 11). Terminal sternite IX of female pupa with a pair of long ventral prolongations (Vp), and a pair of bent, terminal prolongations (Tp) (Figs 14, 14A-C). Ventral prolongations (Vp) distinctly protrude beyond the posterior margins



1-3. Pupa of *Erichsonius cinerascens*. 1 – ventral aspect; 2 – lateral aspect; 3 – dorsal aspect; 3A – microstructure of anterior part of 3rd abdominal tergit; 3B – microstructure of posterior part of 3rd abdominal tergit



4-6. Pupa of *Heterothops niger*. 4 – ventral aspect; 5 – lateral aspect; 6 – dorsal aspect; 6A – microstructure of anterior part of 3rd abdominal tergit; 6B – microstructure of posterior part of 3rd abdominal tergit

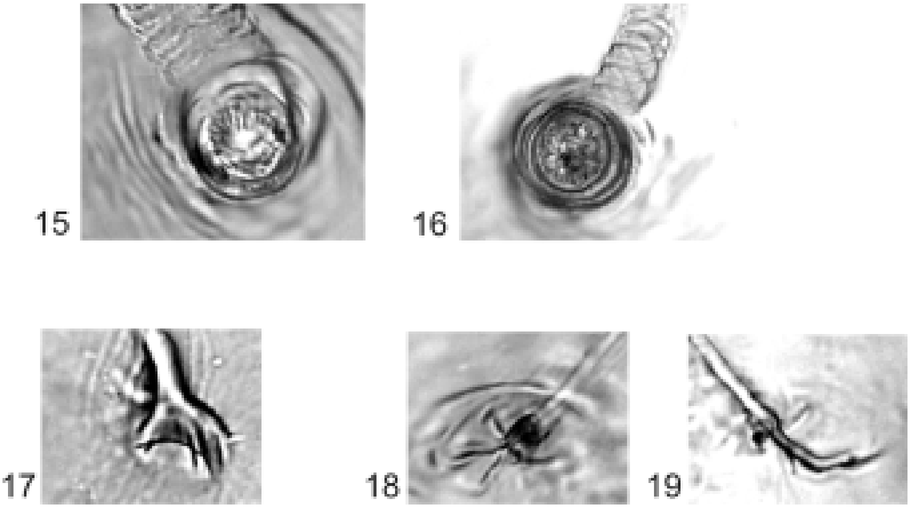


7-14. Pupa. 7, 8. Cuticular processes on abdominal segment I of *E. cinerascens* (7) and *H. niger* (8): 7A, 8A – right process, 7B, 8B – left process. 9-12. Lateral margin of abdominal segment VII of *E. cinerascens* (9, 10) and segment III of *H. niger* (11, 12) with spines. 13, 14. Terminal sternite of female pupa of *E. cinerascens* (13) and *H. niger* (14) (Vp – ventral prolongation, Tp – terminal prolongation): 13A, 14A, B – ventral prolongations of *E. cinerascens* (13A) and *H. niger* (14A, B); 13B, 14C – terminal prolongations of *E. cinerascens* (13B) and *H. niger* (14C) of segment IX (Fig. 14). Abdominal tergites I-IV with tuberculate, functional spiracles, the first pair situated more laterally than the rest (Figs 5, 6, 16); tergites V-VIII with externally visible but apparently atrophied spiracles (Figs 5, 6, 18, 19).

CONCLUDING REMARKS

The combination of the most important, diagnostic characters of the pupae of *Erichsonius cinerascens* (E.c) and *Heterothops niger* (H.n) is as follows:

1. ratio of length to width of head: 1.7 (E.c), 1.4 (H.n); 2. ratio of width to length of pronotum: 1.9 (E.c), 1.7 (H.n); 3. ratio of width to length of labrum: 1.3 (E.c), 1.5 (H.n); 4. number of protuberances on head: 0 (E.c), 2 (H.n); 5. length ratio of abdominal segments VIII and spines on sides: 2.2-2.6 (E.c), 1.8 (H.n); 6. antennae length: protruding slightly beyond 1/3 of the length of the shortened elytra (E.c), protruding slightly beyond half of the length of the shortened elytra (H.n); 7. wings length: protruding beyond posterior margin of 2nd abdominal sternite (E.c), not reaching posterior margin of the 2nd abdominal sternite (H.n); 8. length of hind leg: tarsi reaching 1/3 of the length of 5th abdominal sternite (E.c), tarsi slightly protruding beyond posterior margin of the 4th abdominal sternite (H.n); 9. number of protuberances of middle and hind tibiae: 5 and 0 respectively (E.c), 8 and 4 respectively (H.n); 10. microstructure on abdominal tergites as in: Fig. 3A (E.c), Fig. 6A (H.n); 11. structure of abdominal spines: without processes (E.c), with processes (H.n); 12. structure of ventral and terminal prolongation as in: Figs 13A, 13B (E.c), Figs 14 A-C (H.n); 13. processes on abdominal segment I as in: Figs 7A, 7B (E.c), Figs 8A, 8B (H.n); 14. structure of atrophied spiracles as in: Fig. 17 (E.c), Figs 18, 19 (H.n).



15-19. Pupa. Functional (15, 16) and atrophied (17-19) spiracles in pupae of *E. cinerascens* (15, 17) and *H. niger* (16, 18, 19)

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